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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/889,532	10/02/2001	Jiro Yamada	09794353-001	4317

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EXAMINER

HODGES, MATTHEW P

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/889,532

Applicant(s)

YAMADA ET AL.

Examiner

Matt P Hodges

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

The Amendment, filed on 10/02/2001, has been entered and acknowledged by the Examiner.

Drawings

Figures 1 and 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

Page 1 lines 11-18, the sentence starting with "A device..." does not appear to be a complete sentence.

Page 37 lines 18-23, the sentence starting with "As explained..." does not appear to be a complete sentence.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claims 3, 7, 10, 14, 17, 21, 24, 28, 31, and 35 are objected to because of the following informalities: It should be specified that the variable q is the integer not smaller than 10 that is added to $m1$.

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Claims 36 and 37 are objected to because of the following informalities: Lines 10 of claims 36 and 37 contain the word “determined” which appears to be inadvertently entered. For the purposes of examination it is assumed by the examiner that the first usage of “determined” should be deleted.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-37 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: a semi-reflective portion either part of the second electrode or located next to the electrode as indicated in the drawings and enabled in the specification. This semi-reflective portion is necessary to create the resonance cavity where the resonance cavity includes just the light-emitting cavity for instance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 8, 15, 22, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Isaka et al. (US 5,936,347).

Regarding claims 1, 15, and 22, Isaka discloses (see figure 1) a display device including a light-emitting layer (12), between a first electrode (10) of reflective material, and a second electrode (6) of transparent material. The resonant cavity is formed between the first electrode and the semi-reflective mirror (5) and has an optical length equal to the width of the light-emitting layer. (Column 6 lines 37-65). Further the width of the light emitting layer is set according to the equation on Column 5 line 44, which establishes the width to be the positive minimum value for each desired color emission.

Regarding claim 8, Isaka alternatively allows for a reflective layer to be formed on the outside of the substrate thus including one of the electrodes, the light emitting layer and the substrate in the optical cavity. (Column 8 lines 58-63).

Regarding claim 29, Isaka discloses the use of changing the width of the transparent electrode to control the cavity width of the light-emitting element. (Column 1 lines 53-60).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4, 6, 7, 9-11, 13, 14, 16-18, 20, 21, 23-25, 27, 28, 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable by Xu et al. (US 6,133,692).

Regarding claims 2, 9, and 16, Xu discloses (see figure 1) a display device including a light-emitting layer (12), between a first electrode (15) of reflective material, and a second electrode (18) of transparent material. The resonant cavity is formed between the first electrode and the semi-reflective mirror (21) and has an optical length equal to the widths of both the light emitting layer and the second electrode. (Column 2 lines 36-57). The cavity is multi-mode having peaks in the red, green and blue wavelengths. Xu does not appear to specifically state that the optical cavity length is increased until 4 more resonances for green light are included, however the cavity as disclosed by Xu is multimode and does include peaks in all three wavelengths. Further the applicant fails to identify the use of increasing the optical cavity length until exactly 4 more resonances for green light are included to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. It would have been an obvious design choice to one having ordinary skill in the art to increase the optical cavity length until 4 more resonances for green light are included to the display device as disclosed by Xu, since such a modification would involve a mere optimization of the optical cavity width.

Regarding claims 3, 10, and 17, Xu discloses (see figure 1) a display device as described in the rejection of claim 2 above, but does not appear to specifically state that the optical cavity length is increased until 10 or more resonances for green light are included, however the cavity as disclosed by Xu is multimode and does include peaks in all three wavelengths. Further the applicant fails to identify the use of increasing the optical cavity length until 10 or more

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resonances for green light are included to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. It would have been an obvious design choice to one having ordinary skill in the art to increase the optical cavity length until 10 or more resonances for green light are included to the display device as disclosed by Xu, since such a modification would involve a mere optimization of the optical cavity width.

Regarding claims 4, 6, 7, 11, 13, 14, 18, 20, and 21, Xu further discloses (see figure 1) the use of color filters (13) outside the cavities for transmitting the resonated light. (Column 33-44)

Regarding claims 23-25, 27, and 28, Xu teaches the device as claimed but does not appear to specify the use of just the light-emitting layer to form the cavity. However it has been held that rearranging of parts of an invention involves only routine skills in the art. In this case it would have been an obvious matter of rearrangement of known parts or layers to place the mirrored dielectric between the light emitting area and the second electrode thereby forming the cavity in only the light emitting area. Additionally using the light-emitting area as the cavity allows for a smaller cavity portion while beneficially allowing the light-emitting portion to be sufficiently large to maximize emission. Thus it would have been an obvious to one having ordinary skills in the art the time the invention was made to place the mirrored dielectric between the light emitting area and the second electrode thereby forming the cavity in only the light emitting area, since rearrangement of parts of an invention is considered within the skills of the art and to beneficially allow for a smaller cavity portion while allowing the light-emitting portion to be sufficiently large to maximize emission.

Regarding claims 36 and 37, Xu discloses the device as claimed but does not appear to specify the use of an optical path length where the difference between the peak wavelength of the spectrum of light to be extracted upon a change in view angle and the peak wavelength of the internal emission spectrum is limited to within one half of the half-width of the said internal emission spectrum. However it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In this case it is known in the art to increase the optical path length to increase the number of modes or resonant peaks in the extracted emission spectrum. Increasing the optical path length significantly would serve to produce enough optical path lengths that the extracted emission spectrum is nearly identical to the internal emission spectrum, thus in this case no shift would occur at viewing angles off the perpendicular axis to the device. Therefore to arrive at a value of shift within the specify range would involve only routine experimentation of the workable ranges for the optical path length of the cavity. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an optical path length that satisfies the condition where the difference between the peak wavelength of the spectrum of light to be extracted upon a change in view angle and the peak wavelength of the internal emission spectrum is limited to within one half of the half-width of the said internal emission spectrum, since optimization of workable ranges is considered within the skill of the art.

Claims 5, 12, 19, 26, and 30-35 are rejected under 35 U.S.C. 103(a) as being unpatentable by Isaka et al. (US 5,936,347) in view of Xu et al. (US 6,133,692).

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Regarding claims 5, 12, 19, 26, and 33, Isaka teaches the device as claimed (see rejection of claims 1, 8, 15, 22, and 29 above) but does not appear to specify the use of a color filter on top of the device. However Xu discloses the use of color filters to provide substantially balanced resonant peaks. Thus, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to incorporate the color filters as taught by Xu into the display device as disclosed by Isaka in order to beneficially provide a balanced resonant peak.

Regarding claims 30, 31, 32, 34, and 35, Isaka teaches the device as claimed (see rejection of claim 29 above) but does not appear to specify the use of a color filter on top of the device or the use of a multimode resonant cavity where the optical cavity length is increased until either 4 or 10 or more resonances for green light are included. However Xu discloses the use of color filters to provide substantially balanced resonant peaks and the cavity as disclosed by Xu is multimode and does include peaks in all three wavelengths. Further the applicant fails to identify the use of increasing the optical cavity length until exactly 4 or 10 or more resonances for green light are included to solve any problem or yield any unexpected result that is not within in the scope of the teachings relied upon. It would have been an obvious design choice to one having ordinary skill in the art to incorporate the color filters as taught by Xu and to increase the optical cavity length until 4 or 10 or more resonances for green light are included to the display device as taught by Xu into the display device as disclosed by Isaka since such a modification would involve a mere optimization of the optical cavity width and in order to beneficially provide a balanced resonant peak.

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Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Xu et al. (US 5,949,187) discloses the use of a multi-mode filter on a OLED.

Sun et al. (US 6,091,197) discloses the use of altering the finesse of the cavity to make the emission less dependent on viewing angle.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matt P Hodges whose telephone number is (703) 305-4015. The examiner can normally be reached on 7:30 AM to 4:00 PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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